9 June 1965

MEMORANDUM FOR: Executive Director - Comptroller

THROUGH : Deputy Director for Science and Technology
FBPC

SUBJECT : Action Memorandum A-444; ADP in CIA

Transmitted herewith is a report prepared in response to your Action Memorandum A-444. Committee members included:

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The DD/S&T member did not concur in the Committee's report. His statement of dissent is attached.

For the record, the Committee met 12 times, visited NPIC, RID, OCS, and were briefed on those operations.

I wish to commend each and every Committee member for the positive way he approached the discussions. Despite honest differences of opinion, the forum provided an excellent base for improving mutual understanding and clarifying the basic ADP issues which face the Agency.

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Chairman
ADP Committee

cc: All Members ADP Committee
    DD/S&T
    FBPC

EXCEPTION STATEMENT ON ADP COMMITTEE REPORT

1. The purpose of this exception statement by the DD/S&T Representative to the ADP Committee is to sharpen the focus on the nature of the organizational issue in question here and to provide Agency Management with some coverage of the economic and the technical considerations relevant thereto. Also included under "Conclusions" is a course of action for consideration.

2. The management question posed in Action Memorandum A-444 is:

> Given CIA's increasingly heavy investment in computing activities, how should Agency Management organize those resources for the next five year period to maximize effectiveness at minimum cost?

Stated in alternative form, the basic question becomes:

> Shall CIA continue and extend until complete its present effort to centralize computing resources at the CIA level?

or

> Shall CIA dissolve what is now structured at the CIA level (OCS) and reorganize its computing resources at the Directorate level?*

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3. The ADP Committee's majority conclusion is that the CIA-level
    centralization thrust, which has characterized CIA organizational
    actions in recent years, should not be continued; instead, it should
    be checked...and even reversed. The Committee's report is in-
    tended to lay the groundwork for a) assuring continued separateness
    of the Agency's present computer centers, and b) creating a manage-
    ment climate within which additional centers might reasonably be
    expected to emerge.

4. There are three logical areas of consideration regarding the or-
    ganization of CIA's computing resources: (a) technical, (b) economic,
    and (c) political. The Committee has seriously concerned itself in
    both its discussions and its report with but one of these areas: the
    political. *

5. If it is reasonable to assume that Management, before making this
    study assignment to the Committee, was already familiar with the
    major political considerations involved here then what Management
    most needs is coverage of the other aspects of the question; i.e.,
    the economic and technical considerations. The Committee has not
    provided coverage of same to Management in its report because it
    was the majority opinion of the Committee that sufficiently reliable
    technical and economic projections were not now possible as
    ingredients to Management's decision on the organization of CIA
    EDP** resources. The DD/S&T Representative, however, feels
    economic and technical projections not only can be made but, indeed,
    must be made if Management is to be equipped to consider this or-
    ganizational question. These are the sine qua non ingredients of
    such decision.

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*   The term "political" is not used to deride or belittle this area of
        consideration. Political considerations (such as present organi-
        zational lines, functions, habits, preferences, and plans) are
        important and must be taken into account by Management in any
        organizational decision. Directorate security concepts, as a
        specific, are part of these "political" considerations. (See
        Para. 8 below)

**   The acronym "EDP" (Electronic Data Processing) is used in this
        report to mean "computing" or "relating to computers."

6. <u>TECHNICAL CONSIDERATIONS</u>:

a.   <u>State of the EDP Science</u>:

The computing science is moving into a dramatic third generation.   New generation capabilities in both hardware and software constitute the largest step forward in both <u>productivity</u> and <u>reduced costs</u> in the history of the computing era.   As a consequence, the new generation capabilities will have a major impact on all aspects of computing, including the organization of computing resources.

<u>Some new generation characteristics</u>:

-   New generation gear is faster by several orders of magnitude.

-   Its high speed memories have much larger capacities.

-   Immediate "on-line" access to very large information files is now feasible (several billion characters of on-line storage).

-   A vast array of <u>remote terminals</u> for input, query, and display can now be handled. . . a requirements in upcoming computing support to all CIA Directorates.

-   New generation systems will operate under sophisticated Executive Control Programs which enable the computer to pace and control its own work. . . to the near exclusion of the Computer Operator in the traditional sense. Manual control of the computer from job to job (serial processing) will be grossly inefficient.

-   The capacity for work is increased manyfold. Thruput for the IBM System 360 Mod 67, for example, is equivalent to eight 7090's or thirty 1410's or thirty-five RCA 501's. . . even when operated serially.

    -    The larger models of the new generation computers
provide <u>major bonuses</u> over the smaller models...
in work capacity, in sophistication of techniques,
and in significantly lower costs per unit of data
processed.

b.   <u>Impact on Organization:</u>

The impact of the above processing capacities of the new
generation hardware and software will be felt in virtually all
aspects of computing--management, user, and EDP areas alike.

The direction of impact on organizational structure is
patently clear. The tremendous work capacity, the far-reaching
systems design implications, and the pronounced cost advantages
of the larger models relative to the smaller models will force
greater centralization throughout the computing field.

c.   <u>The new generation OCS Computer Center:</u>

During the past twelve months, OCS has developed its plan
to shift to new generation equipment as rapidly as possible.
(See OCS Computer Systems Planning Report) All computers
in the present CIA Computer Center will be replaced by but
two IBM 360/Mod 67 computers. The first one will be installed
in nine months; the second twelve months thereafter. CIA will
be one of the first major centers to shift to new generation
capabilities. This is much more than a status symbol; the
production and economy gains are truly remarkable.

Some specifics on the OCS third generation center:

    -    The OCS configuration will be a twin-Mod 67
system to which the full range of peripheral
devices can be attached as required by Agency
needs.

    -    The OCS system is a complete "fail-soft" system.
That is, all components are duplicated in the system
so that failure of any component does not stop the
functioning of the system... it only reduces thruput.
The on-line systems now in development in support
of all Agency Directorates will require such fail-
soft support. (This fail-soft structuring of the
machine configuration will tend to characterize
future computing centers of whatever size.)

- The specific configuration of hardware selected by OCS is based on the OCS workload as OCS is now charged within CIA (all Headquarters computing except RID.)

- Projected scientific computing needs of themselves would require a system of similar scale to that planned for the CIA Computer Center because of the stringent speed, memory, and backup requirements which characterize such applications. The production capability of the system, however, would be only very partially tapped if limited to scientific applications alone.

- The Mod 67, selected for the CIA Computer Center, falls in the "upper middle" size range. There are two larger models and three smaller models announced to date. (The Mod 67 is the smallest model of the new IBM 360 series which possesses the I/O controller and sub-selector multiplexor capabilities. These capabilities, in themselves, represent a major third generation stride.) The next smaller model (Mod 50) does not have the capacity to support the Agency's more demanding scientific tasks... and is considerably more costly per unit of information processed.

- No change in the main frame configuration of the OCS Center would be required to do all Headquarters Building computing as anticipated for the next 3 to 5 years.

- If and when additional main frame processing power were needed at some future date, a third CPU could be very simply added to the planned configuration at a cost of about [   ] This additional CPU, at [   ] would provide additional processing power to the system equivalent to five Mod 50's... each one of which would cost much more.

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-5-

- OCS estimates that all Headquarters Building computing (OCS and RID) can be done on the Mod 67 system within a single shift. This is intended as a measure of work volume only. Any Center, of course, which serves remote terminals in user areas must remain open during periods of authorized usage. (For justification of this timing estimate see Appendix B of the OCS Computer Systems Planning Report)

d. Other pertinent specifics:

- New generation gear will process most efficiently with a job mix of maximum diversification. If restricted, organizationally or otherwise, to a single application, much of its thruput power is wasted.

- The concept of re-structuring Agency EDP resources along Directorate lines suggests the following penalties:

  1) The Mod 67, while doing DD/S&T processing, could concurrently process all other Agency computing with less than 15% delay (under worst peak conditions) to DD/S&T processing.

  2) All non-DD/S&T internal computation tasks would be serviced by the Mod 67 in less than half the time required on Directorate centers equipped with their own Mod 50's (the next size down from the Mod 67) and all purely input/output flows (no computation) would run on the Mod 67 system in slightly better time.

- Software extensions and improvements over time will continue to increase the thruput of the gear under discussion so that appreciable increases in workload can be absorbed without acquisition of additional main frame equipment. OCS has projected a utilization of 130 hours per month initially on the Mod 67. Software improvements should permit the handling of a four-fold increase in work in something less than double the machine time.

- Can the IBM 360 software, which is yet to be proven in operations, be counted on to meet specifications? - OCS feels the risk here is a safe one. IBM has traditionally equipped its users with the strongest software packages in the computer industry. This massive corporation has staked its entire future on the success of the 360 system-- including software. IBM is less likely to fail in its commitments than its users are to fail to fully exploit the capabilities being offered.

- The full exploitation of new generation capabilities will require on the part of user organizations advanced technical capabilities in the systems programming area. Although OCS has made a strong start over the past two years at assembling a pool of such skills, system programming skills will be in short supply in CIA and throughout the computing industry with the advent of third generation processing. Decentralization of computing to the Directorates would serve to make the shortage of such hard-to-find and slow-to-grow skills all the more critical.

- The Committee's report contains the following statement: "... 'on-line' applications involving complex interplay between manual and computer based reference facilities... are most effectively managed under complete Directorate control."

> The above statement is in no way concurred in by the DD/S&T representative. There are no technical arguments to support it, and is directly contrary to good economics.

7. ECONOMIC CONSIDERATIONS:

This section presents some measure of the price tag attached to decentralizing Agency EDP resources to the Directorate level. Three types of resources have been considered: a) machine rental dollars; b) people; and c) Headquarters floor space. The figures given are minimum figures in each instance. Although this section on economics is brief, its relevance and import to the organizational issue is second to none. *

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* Major economic overtones are apparent in the preceding section on "Technical Considerations"; q. v.

-7-

a. Additional Rental Costs

In measuring the hardware rental costs for additional centers, the following guidelines were followed:

(1) Costs of "remote on-line" devices and extra capacity peripheral equipments (such as multiple data cells) were excluded. (Basically, they are constant costs whether hooked to Directorate Centers or to the CIA Center and are thus irrelevant to Management as a decision factor).

(2) Only those peripheral devices necessary to the operation of a stand-alone center have been included.

(3) A double-thruput configuration has been assumed for all centers because:

EDP systems in development to support all Directorates (CHIVE, MIS, scientific systems, WALNUT, etc.) call for remote terminals in user areas. The machine language data store for such systems is retrievable only with great difficulty in the event of equipment failure. Thus, in practice, it would be highly improbable that any center, centralized or decentralized, would not find valid justification for double thruput support within the first two years of the five year period under consideration.

The minimum additional annual rental for equipment for any Directorate-level center is presented in Table 1 on the next page.

-8-

Table 1

MINIMUM ADDITIONAL RENTAL COSTS PER CENTER *

(360/MOD 50 Center)

Quantity	Unit #	Description		25X1
2	2050	Mod 50 CPU		
4	6980	Selector Channel		
2	4478	1410 Computability		
2	1052	Adapter		
2	2804	Tape Control		
5	2402	Mag Tape $1,520		
5	7161	R/W $20		
2	2841	Storage Control		
2	7950	2302 Attachment		
2	2302	Disk Storage		
2	1052	Printer-Keyboard		
2	2821-5	Control Unit		
2	3615	1100 LPM Adapter		
2	2540	Card Read/Punch		
2	1403	Printer		
		Minimum Total Per Month		

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MINIMUM ADDITIONAL RENTAL COST PER CENTER.....

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* "Additional" means extra costs per center which would result from Directorate-level structuring as opposed to CIA-level centralization.

b.   Additional People:

The personnel figures given in Table 2 are, in each case, minimum extra personnel requirements to be expected with the endorsement of Directorate-level centers instead of CIA-level centralization.

Computer Operators - Multiple computing centers, of course, mean more computers (2 per center) and more computers mean more Computer Operators. Two-shift operations are assumed in Table 2.

Systems Programmers - As pointed out in Paragraph 6, above, third generation gear and remote terminal systems will force the development and use of Executive Programs for automatic control of operations. Systems Programming will become a must in staffing any center. Our figure of four Systems Programmers per local center is an initial level only; expansion to more than twice that level would soon become a requirement.

Managers/Supervisors/Secretaries - The additional per-sonnel needs in this category stem from the requirement that each EDP center appoint the following: Chief of Operations/Deputy/Secretary; Chief, Systems Programming; Chief, Job Programming/Secretary; Chief, Systems Design/ Secretary; Chief, Punch Section; Shift Supervisor of com-puter room, etc. The figures given in Table 2 are thus very conservative.

Systems Designers/Job Programmers - EDP Systems Designers and Job Programmers have been omitted entirely from Table 2 because of the difficulty of finding an agreed-upon algorithm. Decentralization would, nonetheless, con-sume additional Designer and Job Programmer man-hours and would retard development of skills.

-10-

c.   Headquarters Building Floor Space:

The entries in Table 2 are self-explanatory.

The NPIC Center [   ] will remain as a physically   25X1
separate center whether or not full centralization of Agency EDP re-
sources is determined upon by Management...unless or until adequate
and secure communications facilities are installed between the Head-
25X1   quarters Building [   ] Thus, in this Section on Economic
Considerations, NPIC has not been reflected. Full centralization of
CIA EDP resources would produce technical and some manpower gains
(in the management/administrative, programming, and career develop-
ment areas) but hardware and space costs would not be affected.

For the additional dollar, people, and space resources re-
quired by decentralization of EDP operations to the Directorate, see
Table 2 on the following page.

8. POLITICAL CONSIDERATIONS

There are four parts to "Political Considerations." The first of these is clearly anti-centralization at the CIA level; the second and third of these support such centralization; the fourth (security) is, perhaps, a matter of opinion and can be viewed either way.

a. The "Directorate" Focus:

From a purely parochial view, each Directorate (and NPIC) would probably prefer to have its own EDP resources...people and machines. The majority of the Directorate Representatives to the Committee have reflected this kind of judgment. Some of them feel very strongly about it. It must be noted that this attitude is the only element of this entire organizational question which does not support centralization at the CIA-level. Thus, Management must pay it particular attention and weigh it carefully.

In sum, DD/P wants its own center, NPIC wants its own center. DD/I wants its own center. DD/S has traditionally supported centralization at the CIA level but in Committee discussions has generally acquiesced in the drift of the Committee's thinking toward multiple centers. DD/S&T is, no doubt, subject to the same parochial temptations as any other Directorate but DD/S&T policies in computing and in other areas have traditionally supported centralization across the Agency; the DD/S&T position on the subject issue is that the economic and technical pressures supporting centralization clearly over-ride political considerations and that the objective of CIA policy on EDP should be centralization at the CIA level. The OBPAM Representative to the Committee has voiced no objection to the majority view of the Committee members.

b. Momentum of Past CIA Centralization Actions:

The momentum of past CIA centralization actions support increasing centralization within the Agency. Major centralization actions by CIA Management in the EDP field are as follows:

1) DD/I Automation Staff (functions, personnel, and slots /50 /) centralized into CIA ADP Staff with Agency-wide functions (1961).

-13-

2) CIA ADP Staff (including its IBM 7090, 1410, 1401 center) and ADP Division (including its RCA 501, 301 center) centralized into the Office of Computer Services for Agency-wide support (1963).

3) Two NPIC computing facilities centralized into the Information Processing Division for NPIC-wide support (1964).

4) The bulk of DD/P computing has been centralized in RID from the start.

The five-year evolution of OCS into CIA's all-Directorate computing organization is the dominant theme of the above management actions. The Office of Computer Services is now charged with all Headquarters Building computing for three (DD/I, DD/S, and DD/S&T) of the four CIA Directorates. To turn back now toward Directorate structuring of OCS EDP resources will, of course, be to fragment again what has, since the beginning of this decade, grown together.

c. Extra-CIA Pressures on CIA's Top Management:

The substance of BOB and other Department Circulars and of proposed Congressional actions in the EDP field supports the theme of centralization. These external pressures, although of course based on economic considerations, constitute inputs to the "political" climate in which Agency Management functions.

As a specific, the most recent and most authoritative Government Directive in this area (BOB Circular A-71, dated 6 March 1965) includes the following as a responsibility of the Heads of all Executive Agencies:

> "Merger or integration of data systems irrespective of intra-agency or interagency organizational lines, when cost effectiveness in equipment utilization, data systems management, or program accomplishment can be increased."

-14-

d.   <u>Security</u>:

The Committee has discussed the question of security in connection with centralization of EDP resources. In such context, security becomes an element of the "political" considerations to be considered. It is directly tied to organizational lines and attitudes. This kind of security concept is called "organizational compartmentation" and for the computing function its rule reads: "EDP people <u>inside</u> the organizational boundaries of a Directorate may handle the sensitive materials processed by that Directorate; EDP personnel in a CIA center may not." The distinguishing factor here is the organizational boundary.

Security is a very difficult area to penetrate with the intellect. And, it is often embedded in very strong feelings. A few comments, however, on this security issue as it relates to EDP centralization may be helpful.

1)   <u>Issue has already been fully staffed out:</u>

The entire question of handling sensitive materials in the CIA Computer Center arose soon after OCS was formed. As a result, the Executive Director, in Action Memorandum No. A-365, dated 10 March 1964, requested a thorough study of the question. The issue was analyzed in detail and very comprehensive security control procedures were devised for the Agency's central computing facility and for components using the services of OCS. These detailed security procedures were thoroughly coordinated with all Directorates and then formally approved by the Executive Director.*

OCS has the most studied and presumably the tightest physical and procedural security protection of any computing facility in the Agency. The surfacing of this issue at this point in time tends to reduce a very valid area of CIA concern to a polemic anachronism.

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*   See Staff Study on Security Compartmentation within OCS, DD/S&T, dated 26 March 1964.

-15-

2) The rule of security control:

      A basic rule for protection of data might be the following: "Access to sensitive data by the fewest people feasible, in a highly secure area, under tight procedural controls over both data and personnel."

      The Agency has invested a great deal of thought, time, and money in assuring that its centralized computing facility fits that rule.

      (As for the "Fewest people feasible"--Data processed by computer is in machine-language; not human language. It is translated into human language by the machine as it is printed on the computer's printing device. Computer Operators. tend such printing devices and can observe its outputs. From the Agency-wide point of view, there would, of course, be significantly fewer Computer Operators in a fully centralized shop than in localized centers...as pointed out in Paragraph 7 of this statement.)

3) Centralized processing of sensitive data not limited to EDP:

      Centralized processing of sensitive data is the pattern in several functional areas in the Agency in addition to computing; to wit: security, finance, personnel, printing services, communications, the Cable Secretariat, etc., which serve as offices of common concern for the processing and control of much, if not all, of the sensitive operational, intelligence, and support data in question in computer processing.

4) In sum, because of all the attention already given this question of data protection in the Agency's centralized computer shop, it seems doubtful that Directorate-level centers would be able to improve appreciably security controls so that 1) fewer people would have access to the data or that 2) less likelihood would exist of releasing data to unauthorized persons.

9. CONCLUSIONS:

    The above economic and technical considerations outweigh that portion of the political considerations hostile to continuation and extension of CIA-level centralization policy.

    Therefore, CIA should continue its CIA-level centralization policy:

    1) As opposed to Directorate-level structuring, centralization will:

        ...save [   ] in rentals   25X1

        ...save 57 ceiling positions

        ...save 6,000 sq. ft. in the Headquarters
               Building

        (See Table 2)

    2) It is technically feasible and is most in harmony with the future trend of the EDP science.

    3) It is in harmony with the extra-CIA pressures from BOB and other Departments.

    4) It continues to build on what CIA has already built at the cost of past dislocations.

    5) Given renewed management support, it is managable. (Without that support, it is totally unmanagable.)

    To reverse directions and go the Directorate route would mean:

    1) Splitting up the present CIA-level organization (OCS) into Directorate pieces.

    2) Physically dividing the present CIA Computer Center and its peripheral rooms into separate Directorate areas.

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-17-

3) Building a new computer center for the DD/I.

4) Continued operation of a separate RID center.

5) Committing this Agency to all the personnel and
    hardware and software and space redundancies
    and efficiencies pointed out in Paragraphs 6 and
    7 above.

6) Impairment to acquisition, training and Career
    Development of computing personnel.

7) Moving counter to a) the direction increasingly
    urged by BOB and other government departments,
    b) the direction of past CIA organizational actions,
    and c) the direction which the "third-generation"
    state of the EDP science virtually dictates.

Firm assertion by Top Management that CIA policy should be
to support the centralization progression for this Agency's com-
puting resources need not, of course, --and indeed must not--
lead to operationally destructive implementation actions from
any quarter. With the clear assertion of Management's policy
determination, we can then proceed over time to constructive
integration.

The Agency can reasonably proceed toward more effective
centralization via the following gradual (phased) program:

1) Issue policy statement now clearly supporting
    centralization at the CIA level of computing re-
    sources but scheduling such centralization in two
    phases:

    Phase I - Centralization of hardware/
               operations resources now.

    Phase II - Centralization of outlying EDP
               Systems Design and Job Pro-
               gramming skills after the full
               completion of Phase I (2 yrs. hence).

-18-

2) Centralize over the next few months the day-to-
day management and supervision of CIA computer
operations (hardware, operators of hardware, and
systems programming)--leaving OCS, NPIC, and
DD/P equipment in place, pro tem.

3) Physically consolidate all Headquarters hardware
at the earliest date possible following the intro-
duction of third generation equipment to the CIA
Computer Center.

4) Leave present NPIC, DD/P, and DD/S&T EDP
systems design and job programming resources
under their present components until full realiza-
tion of step "3" immediately above is achieved.

NOTE: It is recognized that, although already feasible technically, it
may be some years before (if ever) it proves profitable to install the neces-
sary communications facilities between Headquarters [   ] to   25X1
permit performing on-line NPIC mensuration computing from the Headquarters
Building. Thus, computer operations in [   ] can be placed under the   25X1
central computing component but must be operated as a second physical site
unless or until adequate communication facilities are installed.

A separate CIA-level EDP management policy and control staff?

1) Certain control, policy, liaison, and reporting func-
tions in the computing field must be performed for
the Agency.

2) Responsibility for same now resides with the AD/CS.
(These Agency-wide "staff" functions had resided
with the former CIA ADP Staff from the inception of
that Staff and came to OCS with the merger of the
ADP Staff into the Office of Computer Services in
1963.)

3) The Committee has talked at length about breaking
this function out from OCS and establishing it in
the Office of the Director.

4) There is no question but that such "staff" functions must be performed. How extensive they should be and where they should be placed organizationally within the Agency are direct functions of which way Management decides the major organizational question: CIA-level or Directorate-level structuring of this Agency's EDP resources.

> (If Management opts to organize its EDP resources by Directorate, a multiple-person staff should clearly be established at the Agency level; if, however, Management determines upon CIA-level centralization of Agency ADP resources, most of these "staff" functions will be inherent to the tasks of that central EDP organization and there will be very little, if anything, a separate staff could more properly do.)

5) Therefore, considerations of this issue (and it is a reasonably simple one) logically must follow determination by Management of the major issue... whether to proceed with the centralization of Agency EDP resources or break-up OCS and provide full EDP resources to each Directorate.

There is a strong need for Agency Management decision now on this EDP organizational question. Whether rightly or wrongly, management resolve on the EDP organizational issue is in full and common question. In the absence of clarification, the ability of our EDP leaders to cooperate or even think constructively about our mutual tasks and objectives is in jeopardy. The direction in which CIA computing resources are to be structured must be set, and quickly, to avoid serious damage to the collective capabilities of this segment of CIA activity.

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DD/S&T Member
CIA ADP Committee